

Remarks/Arguments

Objections to the description

Prior to the entry of this amendment, the description was objected to, with a requirement to acknowledge trade marks by use of block capitals. The amendments to the description do this, and also replace a paragraph where two formulae were accidentally superimposed.

Status of the Claims

Claims 39-73 were pending in this application. In the Office Action all claims were rejected under 35 U.S.C. § 112 as being indefinite. Claims 39 and 44-73 were rejected under 35 U.S.C. § 102(b) as being anticipated by Garcia (US 3,719,228) and by Dill (US 3,797,575) while claims 40-43 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Garcia or over Dill.

The present amendment cancels independent claim 39 and amends independent claims 67 and 73. Claims 40 - 45 and 50 - 66 have been amended to become directly or indirectly dependent on claim 67. Claims 46 - 49 have been cancelled. New claims 74 - 79 have been added. Therefore, claims 40 - 45 and 50 - 79 are now presented for examination in this amendment.

Support for the amendments

The amendments to claims 67 and 73 state that the treatment fluid is non-aqueous, as in previous claim 39. They go further and state that this non-aqueous fluid is based on oil or a mixture containing oil and so is not fully miscible with water. This is taught by page 14 lines 4 to 20. In particular line 20 recommends that a solvent is not fully miscible with water. It is both self evident (and also implicit from the text and illustrated by the two phases seen in Figure 10) that oil is not miscible with water. Consequently, when a treatment fluid is based on oil or a mixture of oil and a solvent which is not fully miscible with water, as taught by page 14, then the treatment fluid will not be fully miscible with water, as is now specified in claims 67 and 73.

Amendment to claim 67 also refers to water or brine entering the formation and causing precipitation of the specified precipitate. Claim 73 has been amended to refer to brine as well as water in the formation. Support for these amendments is provided by page 12 lines 17 and 18 in the description.

Support for new dependant claims can be found as follows:

74 and 75: Claims 9 and 10, claims 47 and 48, page 14 lines 15 and 16.

76 and 77: Page 27 lines 12 to 14.

78: Page 27 lines 13 to 15 and page 35 lines 2 and 4 which explain that the spacer fluid may have similar base to the treatment fluid.

79: Page 12 lines 27 to 33.

No new matter is added by the amendments to claims 67 and 73 or by the addition of the new claims.

Applicants respectfully request reconsideration of this application as amended.

Amendments to the description

The office action called for the acknowledgment of trade marks by placing them in capitals. This has been done. The text already used the initials TM after Dowanol and that usage has now been included systematically. The Office Action required the generic terminology to be given. Applicants respectfully submit that the text already contains full explanation of what was denoted by the various trade names for specific chemicals and thus provides a full statement of the generic terminology.

35 U.S.C. §112 Rejections

This rejection was made because of the word *substantially* in independent claims 39, 67 and 73. That word has been deleted from claims 67 and 73 while claim 39 has been cancelled. It is respectfully requested that this rejection is now withdrawn.

35 U.S.C. §102 Rejections

Garcia US 3,719,228 at column 2 lines 25 to 28 states that a composition is made by first preparing a concentrate which is then diluted with water before use.. This is elaborated further in Garcia's Example 1. A concentrate containing carboxylic acid is prepared in isopropanol as solvent. The concentrate is then treated with ammonium hydroxide to convert the carboxylic acid into its ammonium salt. Next this concentrate containing the salt of the carboxylic acid is diluted with water as mentioned at column 2 line 27 and column 3 lines 40 to 43. It is the resulting aqueous solution which is injected as a preflush solution into the well as mentioned at column 6 line 31.

Consequently Garcia uses an aqueous and water miscible solution whereas the invention as now claimed requires that it is a non-aqueous solution, which includes oil and is not fully water miscible, which is prepared and is introduced into the wellbore. It is therefore submitted that claims 67 and 73 as now amended are novel over Garcia.

Nothing in Garcia contains any suggestion of carrying a precipitable substance down the wellbore whilst it is in solution in a non-aqueous fluid and then bringing about precipitation upon mixing of non-aqueous treatment fluid and water/brine within the formation. On the contrary, Garcia teaches away from this. Garcia's approach relies on precipitation through ion-exchange. A soluble salt of a carboxylic acid, such as an ammonium salt, encounters dissolved calcium and magnesium salts when the aqueous preflush fluid contacts formation brine, as explained by Garcia column 7 lines 15 to 20. Combination of the carboxylate anions and the metal cations leads to formation of insoluble calcium or magnesium salt which precipitates. It will be appreciated that this chemical combination is taking place when the anion and cation of the precipitate are both provided in an aqueous phase, so that an all-aqueous system already exists and is maintained as a common aqueous phase when the aqueous treatment fluid mingles with aqueous brine. Nothing in Garcia leads the reader to imagine that a common aqueous phase, in which water soluble ions meet and combine, could be dispensed with. Thus nothing in Garcia allows the reader to foresee the present invention's approach of bringing about

precipitation through contact of immiscible non-aqueous and aqueous phases within the formation.

Dill, US 3,797,575 uses organic solid material, naming abietic acid as one possibility although benzoic acid is preferred. The method of use is explained by column 2 beginning at line 36. The benzoic acid or other organic solid is dissolved in an organic solvent. Isopropanol is preferred, see column 2 line 63. This solvent solution is then added to an aqueous wellbore treating fluid, as taught by column 3 line 7 (referring back also to column 1 lines 60-61). The result is precipitation of the benzoic acid or other organic solid before the fluid enters the formation. This is explicitly stated by claim 1 of Dill which, at column 10 lines 16 and 17, specifies

“introducing the aqueous treating fluid containing the solid precipitate into the formation”

thus requiring that the precipitate has already formed before the fluid reaches the formation.

Consequently Dill uses an aqueous and water miscible fluid containing a precipitate whereas the invention as now claimed requires that it is a non-aqueous solution, which includes oil and is not fully water miscible, which is prepared, which is introduced into the wellbore and which permeates the formation so that contact with water or brine brings about precipitation within the formation.

Nothing in Dill contains any suggestion of carrying a precipitable substance down the wellbore whilst it is in solution in a non-aqueous fluid and then bringing about precipitation upon mixing of non-aqueous treatment fluid and water/brine within the formation. On the contrary, Dill teaches away from this by calling for precipitation before the treatment fluid encounters the formation downhole. Dill appears to envisage that a precipitated solid can be manipulated to have an appropriate particle size to be carried into the formation. This would, at best, entail a very difficult control of particle size and is a fundamentally different approach to that of the invention.

Use of a non-aqueous treatment fluid, containing oil, as called for by the present invention, has a benefit which is linked to viscosity. A treatment fluid containing oil will be

more viscous than the water or brine encountered within a formation. It will not be a very high viscosity, as indicated by the preference for a viscosity below 100 centipoise stated in the present application, but this is more viscous than water or brine with a viscosity of about 1 centipoise. Consequently, when the injected treatment fluid enters the formation it will flow as a body (so-called piston flow) driving the water or brine before it. This will discourage mixing and precipitation, allowing the treatment fluid to penetrate the formation for some distance outwardly from the wellbore. When injection of the treatment fluid ceases and return flow commences, the return flow of less viscous water or brine will “finger” into and through the more viscous oil-containing treatment fluid, causing mixing and precipitation to occur at a distance outwardly from the wellbore itself. The feature that precipitation occurs during backflow is mentioned in the present description at page 13 line 2 and page 27 line 13. Similarly if there is water coning as mentioned at page 13 lines 10 to 15, or if the treatment fluid is followed by a brine injection as described at page 36 lines 10 onwards and claimed by claim 73, precipitation will occur as the water/brine penetrates the treatment fluid which has already been delivered via the wellbore.

To summarise:

- Neither Garcia nor Dill teach use of a non-aqueous treatment fluid, still less a fluid which contains oil and is not water-miscible.
- Garcia relies on precipitation by chemical combination of anions and cations in an all-aqueous system, pointing away from use of immiscible fluids.
- Dill teaches precipitation on mixing with aqueous wellbore fluid, thus teaching away from precipitation within the formation
- Use of an oil-containing treatment fluid encourages precipitation as water/brine enters or re-enters the formation, thus allowing the precipitate to be spaced away from the wellbore itself.

It is thus submitted that the invention as now claimed is neither anticipated by, nor obvious from, Garcia and Dill.

The Office Action contended that many dependent claims were anticipated by the same documents. It is respectfully submitted that such issues are moot in view of the amendments to the independent claims. Concerning claims 46 to 49, now cancelled and partly replaced by claims 74 and 75 directed to alternative species within claim 67, it is respectfully submitted that the references do not teach a solvent based wellbore treatment fluid. On the contrary they teach solvent-containing concentrates used to prepare aqueous fluids which are placed in the wellbore.

35 U.S.C. §103 Rejections

The Office Action contended that dependent claims 40-43 were obvious in view of Garcia or obvious in view of Dill. It is respectfully submitted that such issues are moot in view of the amendments to the independent claims as discussed above.

Applicants now respectfully submit that all of the limitations of independent claims 67 and 73 as amended, are not disclosed or suggested by Garcia or Dill whether considered individually or in combination. Hence, it is respectfully requested that the section 102 and 103 rejections of independent claims 67 and 73 as amended, be withdrawn. Additionally, it is respectfully requested that the section 102 and 103 rejection of claims depending from independent claims 67 and 73 also be withdrawn.

Conclusion

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested. In the event that a fee or refund is due in connection with this Amendment, the Commissioner is hereby authorized to charge any underpayment or credit any overpayment to Deposit Account No 19-0615.

Should the Examiner have any questions or comments, he is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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